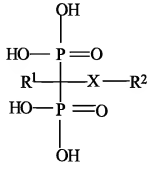
Claims

1. Bisphosphonic acid of the general formula (I)



(I)

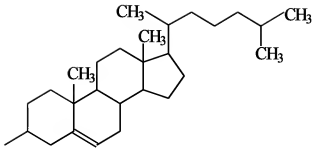
wherein R^1 is H, OH, C_1-C_6 alkyl, C_1-C_6 alkoxy, C_1-C_6 hydroxyalkyl, C_1-C_6 aminoalkyl, C_1-C_6 halogen alkyl,

X is a direct bond, alkylen group with 1 to 20 carbon atoms, $(CH_3)_m$-$(OCR^3HCH_2)_n$-$(O)_o$-, wherein R^3 is H or CH_3 and m is 0 or a number from 1 to 6, n is a number from 1 to 10, preferably 1 to 6, and o is 0 or 1,

$-(CR^4HCH_2O)_p$-, wherein R^4 is H or CH_3, p is a number from 1 to 10, preferably 1 to 6,

$(CH_3)_q$-$(OCR^5HCH_2)_r$-$(O)_s$-$(CH_3)_t$-, wherein R^5 is H or CH_3 and q is 0 or a number from 1 to 6, r is a number from 1 to 10, preferably 1 to 6, and s is 0 or 1, and t is a number from 1 to 6,

R^2 is a group of the formula (II)



(II)

or a fatty alkyl group or a fatty acid group having 8 to 22 carbon atoms,

as well as their physiologically compatible derivatives, in particular salts and trimethyl silyl derivatives.

2. Bisphosphonic acid according to claim 1, wherein R^1 is OH and R^2 is a group that corresponds to the general formula (II).

3. Use of the bisphosphonic acids according to claim 1 as a chelating agent or transport agent for divalent and trivalent metal ions in technical and industrial applications, as a corrosion protection agent in technical and industrial applications, as a pharmaceutical agent, as an additive for active agent transport or as a diagnostic agent.

4. Use according to claim 3, characterized in that the compound of the general formula (I) is bonded to an active agent or a diagnostic agent.

5. Use according to claim 3 or 4, characterized in that the active agent or the diagnostic agent is selected from therapeutic cancer agents, virustatic agents, antibiotics, antimycotic agents, anti-inflammatory agents, substances that stimulates bone tissue or suppress bone tissue.

6. Use according to one of the claims 3 to 5 in combination with or as a component of liposomes, nanoparticles, nanospheres, nanocapsules, micelles, or polymer systems.

7. Method for preparing the compounds of the formula I in which a compound of the formula III, R^2-X-COOH or a reactive derivative thereof, is reacted in a way known in the art with the bisphosphonic acid or tris(trimethylsilyl) phosphite and the obtained product is isolated directly or is converted by hydrolysis into the free phosphonic acid.

8. Liposomal composition comprising a compound of the general formula I, phospholipids and/or a uronic acid derivative.

9. Liposomal composition according to claim 8, characterized in that as a uronic acid derivative palmityl-D-glucuronide and/or galactosyl-D-glucuronide are contained in concentrations of 0.1 mol % to 25 mol %.

10. Liposomal composition according to claim 8 or 9, characterized in that the phospholipids are selected from phosphatidyl choline, phosphatidyl glycerol, phosphatidyl ethanolamine, phosphatidyl inositol, phosphatidyl acid, sphingomyelin, ceramide in their natural, semi-synthetic or synthetic forms as well as stearyl amine and cholesterol.

11. Liposomal composition according to one of the claims 8 to 10, characterized in that it is present as an aqueous dispersion or as a lyophylisate.

12. Method for producing a liposomal composition according to the claims 8 to 11, wherein a raw mixture of the individual components such as palmityl-D-glucuronide, phospholipids, bisphosphonic acid(s) or a derivative thereof of the general formula (I) and any individual active substance or combination of active substances are mixed with one another by ultrasound, high-pressure extrusion, or high-pressure

homogenization.

13. Use of a liposomal composition according to claim 8 to 11, for preparing a medicament for treating human diseases and animal diseases.